

Comparison of Oral Reading Errors between Contextual Sentences and Random Words among Schoolchildren

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Abstract

This paper compares the oral reading errors between the contextual sentences and random words among schoolchildren. Two sets of reading materials were developed to test the oral reading errors in 30 schoolchildren (10.00 ± 1.44 years). Set A was comprised contextual sentences while Set B encompassed random words. The schoolchildren were asked to read both contextual sentences and random words reading charts at random order, loudly at normal reading speed. The reading errors were quantified based on the number of mistakes made during reading. The errors were classified into 6 categories; mispronunciations, substitutions, refusals, additions, omissions, and reversals. The results indicated the mean number of errors made by schoolchildren in reading sentence of Set A and Set B were 1.30 ± 0.23 words and 2.70 ± 0.41 words respectively. Random words, Set B, gave a significantly higher number of reading errors compared to contextual sentences, Set A, ($U=287$, $z=-2.46$, $p=0.01$). Reading the random words gave higher number of errors compared to reading the contextual sentences. Mispronunciations and substitutions were the most possible types of errors made when reading Set B ($U=234$, $z=-3.60$, $p=<0.01$ and $U=325$, $z=-2.00$, $p=0.04$ respectively). Schoolchildren tended to mispronounce and substitute some words during reading the random words. In comparing the number of oral reading errors made between schoolchildren and young adults, there was no significant difference. A similar pattern of the type of errors was also found in oral reading errors in both schoolchildren and young adults. Overall findings could be linked to the existence of comprehension during reading the contextual sentences compared to reading the random words.

Keywords: oral reading error, contextual sentences, random words, schoolchildren, reading

1. Introduction

Skills that lead to efficient reading are very important especially in schoolchildren because the reading ability is essential for curriculum access. Younger children are in the phase of learning to read and reading is a requirement for learning in older children. Therefore, it is necessary to assess the ability of reading in children (Douglas et al., 2002). Reading performance and reading assessment can be quantified in terms of reading acuity (Colenbrander, 2005), reading rate (Legge et al., 1985), reading speed (Mansfield et al., 1996), critical print size (Mansfield et al., 1993), reading comprehension (Savolainen et al., 2008), and reading error (Douglas et al., 2002). Oral reading error was also referred to as miscue and could be defined as selection of the wrong word in a printed text, which was not the word intended by the writer of the text (Labov & Baker, 2010). Oral reading fluency, which required the subject to read accurately within the time given, was found to be strongly related to reading comprehension (Kim et al., 2012). This might indicate the association between accuracy and improved the understanding in reading process.

Oral reading error or reading accuracy studies are mostly analyzed among children with low vision (Graeme Douglas et al., 2004), dyslexic children (Seki et al., 2008; Singleton, 2005; Thomson, 1978), and children with reading difficulties (Dusek et al., 2011; Dusek et al., 2010). Low vision children lagged in reading performance in terms of accuracy, comprehension and speed compared to normal sighted children (Douglas et al., 2004) and a majority of reading error fell into substitutions and mispronunciations. A previous study on dyslexic children indicated that the reading speed and reading errors were significantly higher compared to children with normal vision (Seki et al., 2008). The reading error score was also evaluated on children with reading difficulties before

and after treatment of convergence insufficiency (Dusek et al., 2011). Dusek et al. (2011) found that the reading speed and reading error scores significantly improved after treatment was given, where subjects with prismatic spectacles showed the greatest improvements. Poor readers read very slowly and made almost twice as many errors compared to a good reader in Chinese second grade students (Wu & Anderson, 2007).

There are several alternatives in assessing near vision. Near point acuity cards are easily found in the market and easy to own, for example Jaeger card, Lighthouse near-acuity test, Keeler reading test and Leibsohn near-vision test chart (Jose & Atcherson, 1977). It usually displays selected alphabets, digits or symbols. There is also the near vision chart, which displays continuous text constructed from several words that can also be used for reading assessment. Various reading charts have been established to be used as a tool in assessing the reading performance. Reading charts have been designed either using the contextual sentences or random words. The contextual sentences reading charts such as MNREAD acuity charts (Mansfield et al., 1993), Practical Near Acuity Chart (Wolffsohn & Cochrane, 2000), and Radner Reading Chart (Stifter et al., 2004) are widely used. It has also been translated to other languages (Fujikado et al., 2002; Idil et al., 2011; Maaijwee et al., 2008; Matafasi et al., 2013; Radner & Diendorfer, 2014). On the other hand, the random words reading chart has also been designed and tested by previous studies such as Bailey-Lovie Word Reading Chart (Bailey & Lovie, 1980). As for Malay language reading chart, the UiTM Malay related word reading chart (Buari et al., 2014) and UiTM Malay unrelated word reading chart (Buari et al., 2015) have been designed and developed to be used in the reading assessment for Malay native speakers. Reading charts were used to determine the threshold for near reading, reading speed, reading time and reading error.

Near vision in routine optometric assessment is usually evaluated using the reading chart with sentence structured text as it represents real reading activity in routine daily life. Most of the reading materials available were constructed in contextual sentence structured text. However, the over-estimates of reading acuity can be derived from the contextual cues which encourage and assist guessing from the use of related words sentences (Bailey & Lovie, 1980). Due to that, the random words sentences were suggested in designing the reading chart. The random words sentences comprised several words that did not contain any contextual meaning. It was believed to be more reliable in assessing the visual capacities related to reading as it used a group of words that are not related by syntax (Bailey & Lovie, 1980). An individual relied on visual information in contrast to syntactic and semantic clues by reading the non-contextual sentences or unrelated words sentences (Latham & Whitaker, 1996). In the context of brain mechanisms, reading the meaningful reading materials activated the left posterior middle temporal gyrus and mesial temporal lobe areas, while reading the meaningless structure sentence was associated with reduced activation of these two regions (Simos et al., 2002). In addition, reading the unrelated words (UiTM-Muw) reading chart showed a significantly higher total reading error made, 3.5%, compared to standardized English related words reading chart use MNread acuity chart and Colenbrander reading chart, almost only 1% for both charts (Buari et al., 2015). The increasing number of reading errors might lead to the reduction of reading speed. Reading speed lower with random words compared to contextual sentences.

The concept of reading speed includes reading error. Previous studies mainly focused on the reading error made in contextual sentences either in schoolchildren or adults readers. Therefore, it was beneficial to study the effect of sentence structure on reading error among schoolchildren. This study designed to compare oral reading errors between contextual sentences and random words structured text among the schoolchildren. With the inclusion of young adults group using the same reading materials, the findings from this study helped to understand the importance of word structure among schoolchildren.

2. Method

An experimental comparative study was conducted to determine the effects of contextual sentences and random words structured text on oral reading error among schoolchildren. Two sets of reading materials: contextual sentences (Set A) and random words (Set B), were designed to be used in this study (Figure 1). Set A comprised contextual sentences in the form of meaningful sentences whereby Set B encompassed of several words without contextual meaning. Each set comprised 14 short sentences with 6 words in each sentence. The print sizes ranged from 8.0M to 0.4M, equivalent to 1.3 logMAR to 0.0 logMAR. Each print size had 12 syllables, 31 to 35 characters including spaces. The Arial font type was chosen. Both Set A and Set B reading materials were printed on the matte white card. The sentences were arranged from the largest print sizes to the smallest print sizes which mimic the standardized structure of reading chart similarly to UiTM-Mrw reading chart (Buari et al., 2014) and MNRead acuity chart (Subramanian & Pardhan, 2006).

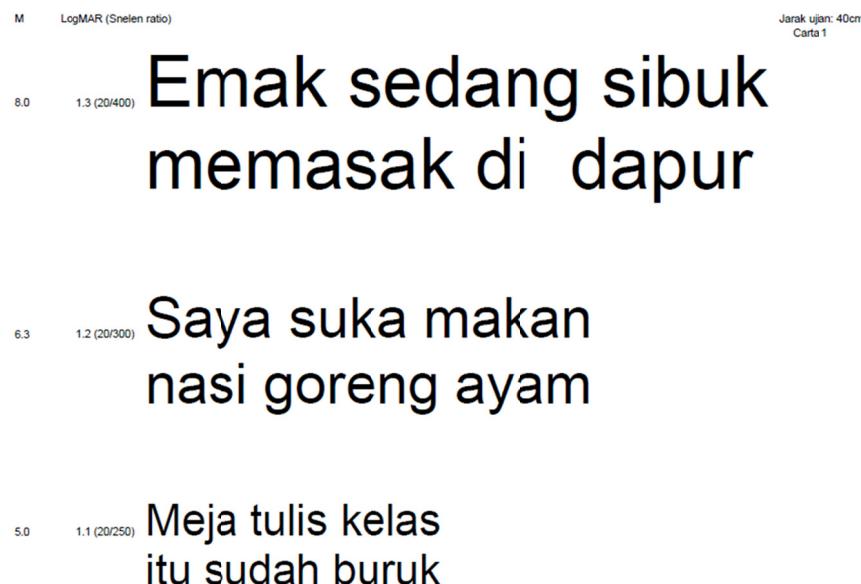


Figure 1(a). Set A (contextual sentences)

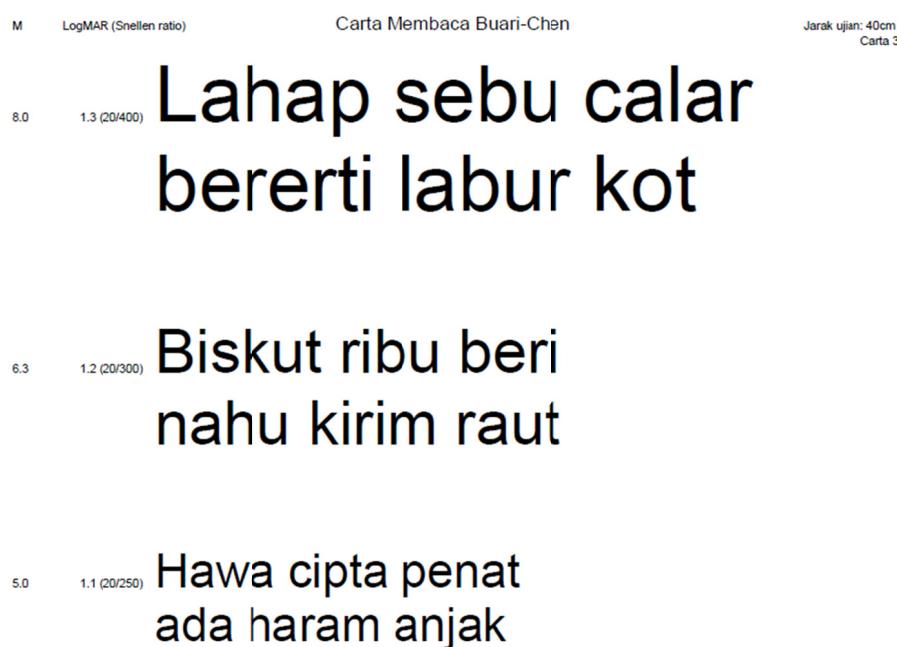


Figure 1(b). Set B (random words)

The oral reading errors were recorded while the schoolchildren read the Set A and Set B reading materials. It was placed on slanted reading stand of 45 degree at 40cm reading distance from the eye. Sufficient illumination was set up for reading, 250 to 350 lux. The Set A and Set B reading materials were assigned randomly to every participant. They were asked to read loudly at normal reading speed from the largest to the smallest print sizes. The reading region was recorded for post-analysis of reading error. The oral reading errors were noted and

classified according to Neale Analysis of Reading Ability–Second Edition (NARA II). The NARA II classified reading error into 6 categories; mispronunciations, substitutions, refusals, additions, omissions, and reversals (Douglas et al., 2002).

The subject recruitment for the experiment target group consisted of 30 schoolchildren (mean age: 10.00 ± 1.44 years) from the primary school under the Malaysian Ministry of Education. The criteria are fluent in the Malay language, habitual distance visual acuity of 0.1 logMAR ($6/7.5$ Snellen acuity) or better binocularly, without any previous history of ocular or vision disorders. Thirty young adults (mean age: 22.93 ± 2.89 years) were included for further confirmatory test. Informed consent was obtained prior to participation. This study adhered to the tenets of declaration of Helsinki and was approved by the Research Ethic Committee of the university (Approval code: 600-RMI (5/1/6) REC/108/15).

Vision screening was conducted prior to reading assessment. Distance visual acuity was measured binocularly using Bailey-Lovie logMAR chart at a distance of 3 m. Children who did not achieve a minimal requirement of distance visual acuity will be excluded from proceed to the next assessment. The binocular vision status was screened using remote near point of convergence and near point of accommodation to detect any gross binocular vision dysfunction using Royal Air Force (RAF) rule. The reading assessment was piloted right after the subjects had passed the screening procedures.

The analysis was performed to compare the total number of errors and error made for each category of reading error between contextual sentences and random words structured sentences. Total number of reading errors made was also compared between schoolchildren and young adults. The data entry and analysis of reading errors were performed using Statistical Package for Social Sciences (SPSS) version 20.0. The data were not normally distributed (Shapiro-Wilk: $p > 0.05$), therefore the analysis then proceeded to use the independent samples of nonparametric tests, Mann-Whitney U Test. The significant value was set at $p < 0.05$.

3. Results

Comparison of total number of oral reading errors between Set A (contextual sentences) and Set B (random words) reading materials was determined using Mann-Whitney U test. The mean for total number of errors made by schoolchildren when read Set A and Set B were 1.30 ± 0.23 words and 2.70 ± 0.41 words respectively. As shown in Figure 2, schoolchildren significantly made more errors in reading the Set B, which was the random words structured sentences compared to Set A, which was the contextual sentences ($U = 287$, $z = -2.46$, $p = 0.01$). On the other hand, the total oral reading errors made by young adults in reading Set A were 0.77 ± 0.18 words and 1.57 ± 0.25 words in Set B (Figure 2). The comparative number of error between these two sets of reading materials showed a significant difference ($U = 299$, $z = -2.34$, $p = 0.02$). The outcomes on young adults were similar to the findings on schoolchildren. The mean number of error made in reading the Set B was almost two times higher compared to Set A.

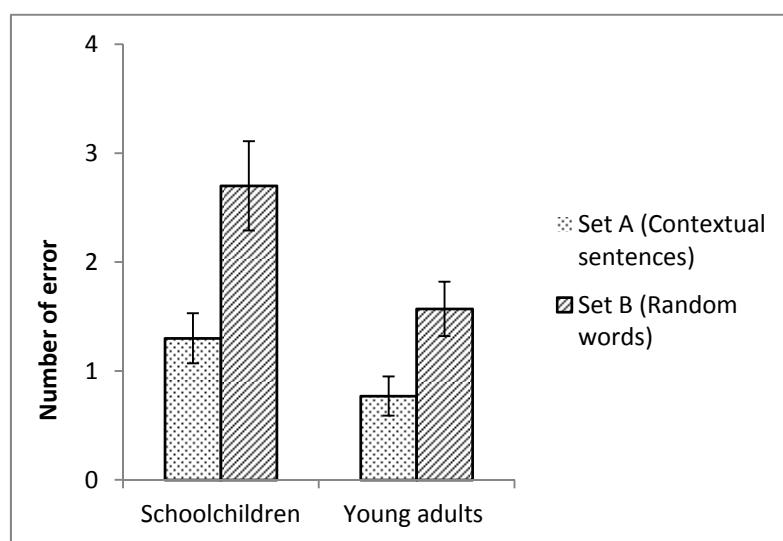


Figure 2. The comparison of mean total number of errors made between contextual sentences (Set A) and random words (Set B) structured sentences in schoolchildren and young adults

Further analysis of oral reading error between Set A and Set B reading materials were expressed in Figure 3(a) and 3(b) for schoolchildren and young adults respectively. The oral reading errors were categorized as mispronunciations, substitutions, refusals, additions, omissions, and reversals. From six categories of reading errors made by schoolchildren, three categories were significantly difference between Set A and Set B, i.e the mispronunciations ($U = 234$, $z = -3.60$, $p = <0.01$), substitutions ($U = 325$, $z = -2.00$, $p = 0.045$), and omissions ($U = 344$, $z = -2.53$, $p = 0.01$). The mispronunciations and substitutions were prone to be made with Set B (random words) reading materials; whereby omissions were found to be made with Set A (contextual sentences). The types of reading errors made by young adults were also similar as in the schoolchildren, which were mispronunciations and substitutions. Those types of error were significantly higher made by reading the Set B ($U = 285$, $z = -2.90$, $p = <0.01$ and $U = 303$, $z = -2.60$, $p = 0.01$ respectively).

In the comparison of total oral reading errors between schoolchildren and young adults, there was no significant difference either in Set A, contextual sentences, ($U = 337$, $z = -1.76$, $p = 0.08$) or Set B, random words, ($U = 324$, $z = -1.89$, $p = 0.06$). The majority of reading errors fall into mispronunciations and substitutions in both schoolchildren (Figure 3(a)) and young adults (Figure 3(b)). Thus, further analysis was decided to focus upon the differences between contextual sentences and random words for these types of errors. Then, the differences of errors were compared between schoolchildren and young adults. In the differences of reading errors between contextual sentences and random words, neither mispronunciations nor substitutions were found significantly difference among schoolchildren and young adults.

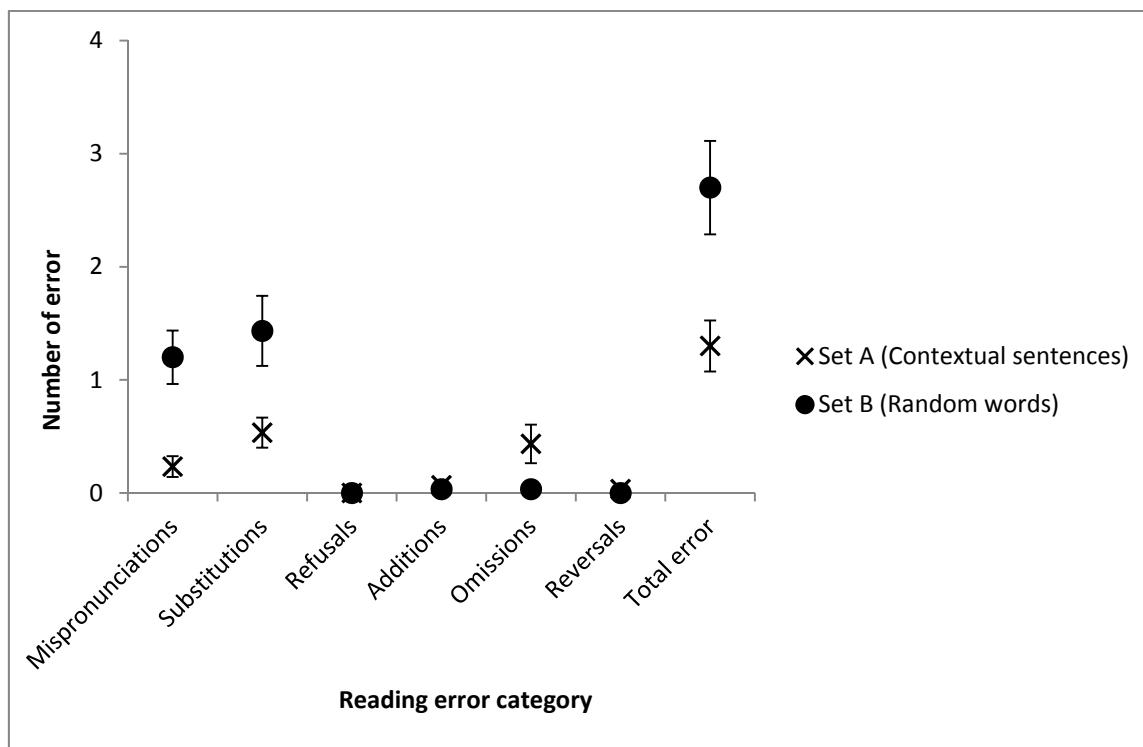


Figure 3(a). The comparison of total errors in each category of reading error made by schoolchildren for contextual sentences and random words

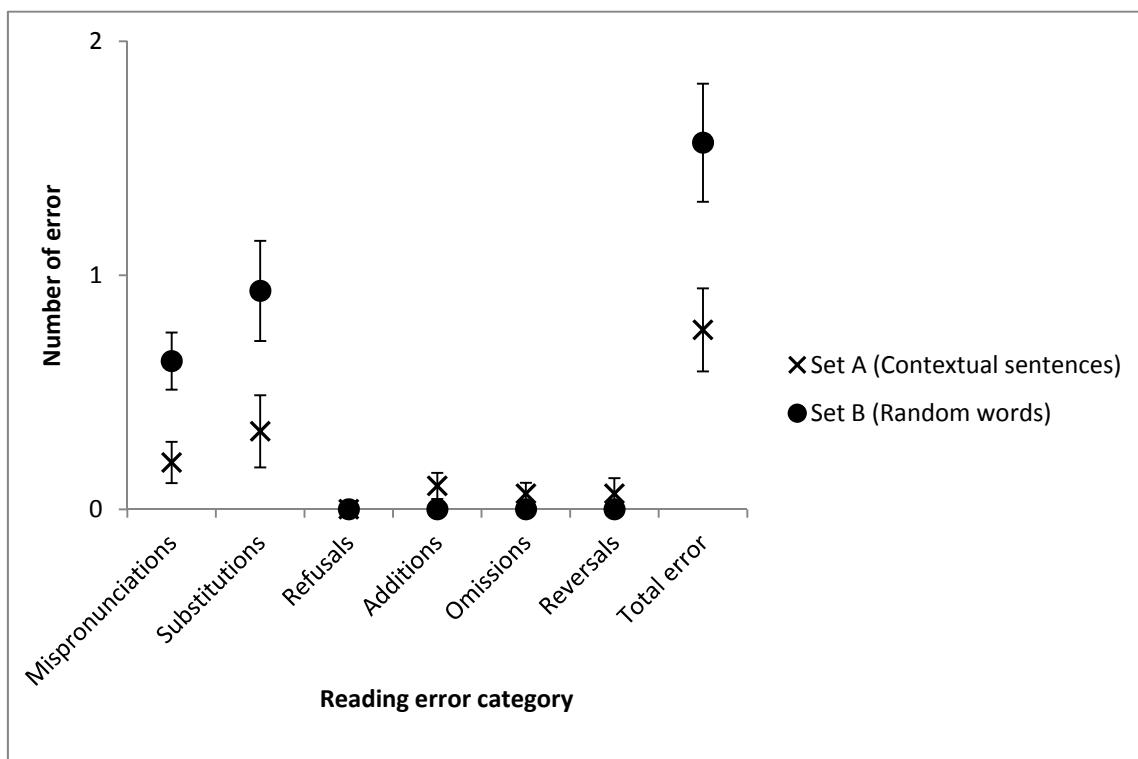


Figure 3(b). The comparison of total errors in each category of reading error made by young adults for contextual sentences and random words. The error bar indicated the standard error of the mean

4. Discussion

The comparison of reading two different reading materials, Set A (contextual sentences) and Set B (random words) was found that the total oral reading errors made by schoolchildren was higher in Set B than Set A. This might suggest that the schoolchildren easily read the contextual sentences compared to the random words structured sentences. The mean reading error made when reading the Set A and Set B were 1.30 ± 0.23 words and 2.70 ± 0.41 words respectively. Measurement of reading ability and reading error in previous study between normal children and dyslexic children using Japanese sentences showed that the reading error made by the normal children was lower than found in this study i.e. 0.40 words (Seki et al., 2008) even though it was conducted on similar age of normally sighted children. The differences may be due to the disparity of word syllables between Malay and Japanese. It was also found that the dyslexic children tended to make 7 times more reading errors than the normal children (Seki et al., 2008). The reading errors among 2nd grade Chinese student were measured to investigate the characteristics of oral reading strategies (Wu & Anderson, 2007). The number of reading errors in Wu and Anderson's (2007) study was higher, ranging from 4.2 words to 8.0 words. This might be because of the difference in reading materials construction; the Chinese passage with similar print sized and the Malay language sentences with various print sizes. In addition, the children were subcategorized based on their reading level; high, average and low. Those who were poor readers (low reading level) tended to make twice number of error than good reader (high and average reading level) (Wu & Anderson, 2007). However, both studies (Seki et al., 2008; Wu & Anderson, 2007) used contextual sentences to assess the reading error, but this study compared the reading error between contextual sentences and random words structured sentences.

The random words comprised several words to form sentences but without contextual meaning. The reason of construction the random word sentences as reading chart is to assess reading acuity because it was reliable and the influence of context can be eliminated, so that the print size is the only parameter affecting the reading performance (Bailey & Lovie, 1980). However, in assessing the reading performance among schoolchildren, reading acuity was not the only parameter that needed to be observed. It was found that words in context were being read accurately than words in the list (without context) among skilled readers (Kim et al., 2012). These seemed to show that the schoolchildren were prone to make more mistakes when reading non-contextual sentences compared to contextual sentences. Syntactic competence was one of the three important components to

indicate the concurrent development of children's oral language other than vocabulary knowledge and understanding of narrative grammar (Scull, 2013).

The reading performance among schoolchildren was mainly tested on reading rate, reading comprehension, and also reading accuracy (Douglas et al., 2002; Mohammed & Omar, 2011; Seki et al., 2008). This is because the skills that lead to successful reading are very important to be inculcated at an early age. Furthermore, the reading performance among schoolchildren was important in assessing, detecting and diagnosing children with reading difficulties (Dusek et al., 2010), dyslexia (Singleton, 2005), and low vision (Douglas et al., 2004; Mohammed & Omar, 2011). Present studies showed a different in frequency of total reading errors between schoolchildren and young adults (Figure 2), where schoolchildren made a higher number of errors compared to young adults. This might suggested that the older reader would have acquired more experiences in reading compared to younger reader. However, statistical analysis was found that error made by the schoolchildren and young adults was not significantly difference, as the differences of reading errors were only 0.5 words and 1.1 words for contextual sentences and random words, respectively. Thus, suggested a similar pattern of total number of errors and type of reading errors made by schoolchildren and young adults. This similarity may be due to the age selected for schoolchildren were 8 years and above. The reading skills were believed to be achieved by an individual as young as 8 years old (Mataftsi et al., 2013). Besides, this study findings implied that comprehension affect the overall output. Both schoolchildren and young adults read the contextual sentences better than random words, in terms of the number of errors, due to the existence of comprehension for the whole sentences. This theory was supported by previous study reviewed on oral reading error assumed that the number of oral reading errors made was inversely related to the reading comprehension (Leu, 1982).

This study showed that mispronunciations and substitutions were the most errors made by the schoolchildren compared to other types of errors such as reversal, refusal, addition and omission. However, both mispronunciations and substitutions were similarly made by schoolchildren and young adults in contextual sentences and random words. The normal sighted children aged 7–10 years old were also prone to make more mispronunciations and substitutions error (Douglas et al., 2004). This correlates with this study by which the most errors made by schoolchildren aged 8–12 years were also mispronunciation and substitution. Previous studies assessed on oral reading errors among 16 to 60 years old readers found that the highest errors were pause errors followed by insertion, substitution and omission errors. The pause error was considered when the subjects made extra pauses that were not between paragraphs or at end-of-phrases (Williams & Reiter, 2001). This showed that the subjects tend to stop reading not at the right places. This current study was implemented the reading error category from NARA II classification (Douglas et al., 2002) where pause is not included as reading error. Substitutions were found among the common errors made in study by Williams and Reiter's (2001), this was quite similar to this current study where substitution errors were the most common error done not only by the schoolchildren but also the young adults. Children tend to propose a familiar word in reading context if they are uncertain about a word in that sentence (Singleton, 2005). On the other hand, omissions were more prone to be made by reading the contextual sentences. In the context of eye movement, by reading shuffled text or a meaningless word list, an individual will take longer fixation, less word skipping, and more re-fixation (Schad et al., 2010). Thus, omission was made more often by reading related words compared to random words structured sentences. With support from previous studies (Douglas et al., 2002; Douglas et al., 2004; Williams & Reiter, 2001), this current study hypothesized that mispronunciations and substitutions were a normal reaction of comprehension during reading. Whereas, the other components of reading errors; reversal, refusal, addition and omission might be an indication of vision problems, especially for near vision.

5. Conclusion

The schoolchildren were found to be significantly higher in making oral reading error with random words structured sentences reading material compared to contextual sentences. The comprehension that generated during reading the contextual sentences made the reading error lesser compared to read the random words. The mispronunciations and substitutions were the most significant type of errors made in reading the random words among schoolchildren. The similar pattern was also found in young adults. This might be suggested that mispronunciations and substitutions were a normal reaction of comprehension during reading. This study only tested on normally sighted schoolchildren and young adults. Future study might explore oral reading error pattern among different conditions of visual problems, such as low vision with different natures and severities, or children with learning difficulties.

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